Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application:

What is Claimed:

1.-15 (Canceled)

16. (Currently Amended) The microfluidic device of claim [[1]] 91, wherein the sample-containment region contains a dried sample.

17. (Currently Amended) The microfluidic device of [[1]] 91, wherein the sample-containment region further comprises at least one of a nucleic acid sequence probe or nucleic acid sequence primer disposed therein.

18. (Original) The microfluidic device of claim 17, wherein the at least one nucleic acid sequence probe or nucleic acid sequence primer is in a dried form.

19. (Currently Amended) The microfluidic device of claim [[1]] 91, wherein the at least one sample-containment region comprises a plurality of sample-containment regions arranged in an array.

20.-60. (Canceled)

61. (Withdrawn) A method for venting a gas from a microfluidic device comprising:

providing a microfluidic device, the microfluidic device comprising;

at least one sample-containment region capable of containing a sample;

at least one non-porous, gas-permeable sample sealing plug at least partially defining the at least one sample-containment region, and comprising a non-porous, gas-permeable material;

an input opening in fluid communication with the sample-containment region;

loading a liquid into the microfluidic device; and

venting a gas from the microfluidic device through the at least one non-porous, gas-permeable sample sealing plug.

62. (Withdrawn) The method of claim 61, wherein the non-porous, gas-permeable material comprises a material having a permeability coefficient at about 35° C relative to O_2 of at least about 8×10^{15}.

63. (Withdrawn) The method of claim 61, wherein the non-porous, gas-permeable material comprises a polysiloxane material.

64. (Withdrawn) The method of claim 61, wherein the non-porous, gas-permeable material comprises at least one member selected from polydimethylsiloxane materials, polydiethylsiloxane materials, polydiphenylsiloxane materials, polymethylethylsiloxane materials, polymethylphenylsiloxane materials, and combinations thereof.

65. (Withdrawn) The method of claim 61, wherein the non-porous, gas-permeable material comprises a polydialkylsiloxane material.

66. (Withdrawn) The method of claim 61, wherein the non-porous, gas-permeable material comprises a polydimethylsiloxane material.

67. (Withdrawn) The method of claim 61 further comprising applying a gas-impermeable membrane to the at least one non-porous, gas-permeable sample sealing plug.

68. (Withdrawn) The method of claim 61, wherein the microfluidic device includes a channel in fluid communication with the sample-containment region, and the method further includes interrupting fluid communication through the channel.

69. (Withdrawn) A method for venting a gas from a microfluidic device comprising:

providing a microfluidic device, the microfluidic device comprising;

at least one sample-containment region capable of containing a sample;

at least one non-porous, gas-permeable sample sealing cover layer at least partially defining the at least one sample-containment region, and comprising a non-porous, gas-permeable material;

an input opening in fluid communication with the sample-containment region;

loading a liquid into the microfluidic device; and

venting a gas from the microfluidic device through the at least one non-porous, gas-permeable sample sealing cover layer.

70. (Withdrawn) The method of claim 69, wherein the non-porous, gas-permeable material comprises a material having a permeability coefficient at about 35° C relative to O_2 of at least about 8×10^{15}.

71. (Withdrawn) The method of claim 69, wherein the non-porous, gas-permeable material comprises polysiloxane material.

72. (Withdrawn) The method of claim 69, wherein the non-porous, gas-permeable material comprises at least one member selected from polydimethylsiloxane materials, polydiethylsiloxane materials, polydiphenylsiloxane materials, polymethylethylsiloxane materials, polymethylphenylsiloxane materials, and combinations thereof.

73. (Withdrawn) The method of claim 69, wherein the non-porous, gas-permeable material comprises a polydialkylsiloxane material.

74. (Withdrawn) The method of claim 69, wherein the non-porous, gas-permeable material comprises a polydimethylsiloxane material.

75. (Withdrawn) The method of claim 69, further comprising applying a gas-impermeable membrane to the at least one non-porous, gas-permeable sample sealing cover layer.

76. (Withdrawn) The method of claim 69, wherein the microfluidic device includes a channel in fluid communication with the sample-containment region, and the method further includes interrupting fluid communication through the channel.

77. (Withdrawn) A method comprising:

providing a microfluidic device including a plurality of sample-containment regions;

loading the plurality of sample-containment regions with a sample to form loaded sample-containment regions; and

sealing the loaded sample-containment regions with a non-porous, gas-permeable material cover layer.

78. (Withdrawn) The method of claim 77, further comprising:

loading a nucleic acid sequence probe or a nucleic acid sequence primer into selected sample-containment regions.

79. (Withdrawn) The method of claim 78, wherein the nucleic acid sequence probe or the nucleic acid sequence primer is loaded into the loaded sample-containment regions.

80. (Withdrawn) The method of claim 78, wherein the nucleic acid sequence probe or the nucleic acid sequence primer is loaded prior to loading the plurality of sample-containment regions with the sample.

81.-87. (Canceled)

88. (Currently Amended) The microfluidic device of claim [[1]] 94, wherein the gas-impermeable first cover layer comprises an aluminum film layer.

89. (Currently Amended) The microfluidic device of claim [[1]] 94, wherein the gas-impermeable first cover layer comprises a polyolefin film.

90. (Currently Amended) The microfluidic device of claim [[1]] 94, wherein the gas-impermeable first cover layer comprises a polytetrafluoroethylene layer.

91. (New) A microfluidic device for processing nucleic acids, the device comprising:

a sample distribution network formed in a substrate, said substrate suitable for PCR processing of a nucleic acid sample, wherein the sample distribution network comprises at least one sample-containment region in fluid communication with a sample inlet region and a sample outlet region;

a first cover layer sealing the sample distribution network, wherein the cover is formed from a PCR compatible material; and

a venting region formed in fluid communication with the sample outlet region, said venting region having a second cover formed from a non-porous, gas-permeable material; wherein the venting region is positioned to avoid interaction between a sample disposed in a sample-containment region and the non-porous, gas-permeable cover.

92. (New) The microfluldic device of claim 91, wherein the substrate is selected from a glass or polymer material that can withstand thermal cycling between 60 °C and 95 °C.

93. (New) The microfluidic device of claim 91, wherein the non-porous, gas-permeable material is a polysiloxane material.

94. (New) The microfluidic device of claim 91, wherein the PCR compatible first cover layer is gas impermeable.